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**Cruise Report
POSEIDON 303**

**Reykjavik - Tórshavn – Galway
11. 09. – 23.09. – 24.09. – 06.10.2003
Technical Report 2-03**

On citing this report in a bibliography, the reference should be followed by the words
unpublished manuscript.



Painted by Kari Guddal on Poseidon cruise 303

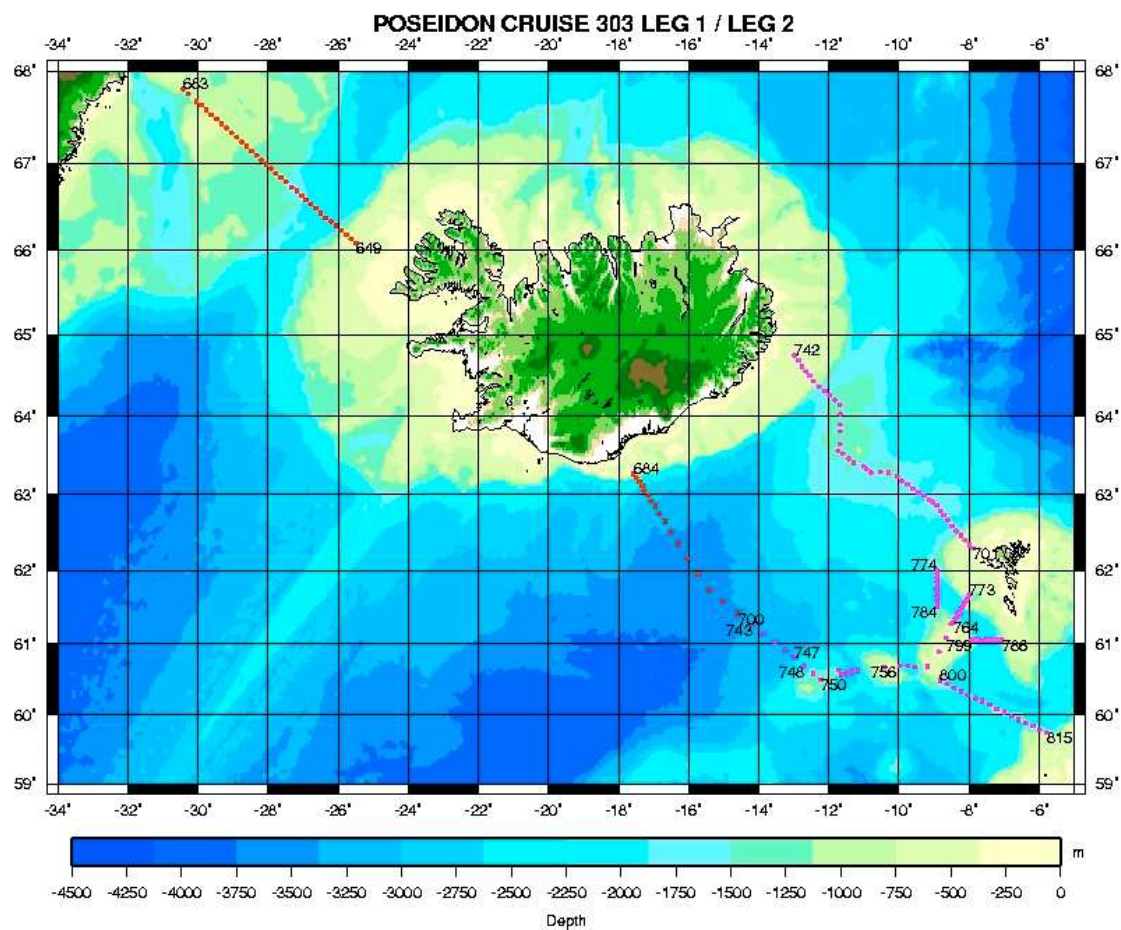


Figure 1: Overview over the measurements carried out during Leg 1 (red dots) and Leg 2 (magenta dots) of POSEIDON cruise 303.

List of CTD / IADCP Stations POSEIDON 303/1

| Station | Date | Time (UTC) | ϕ (°N) | ϕ (°N) | λ (°W) | λ (°W) | Depth (m) | Max. pressure | Instrument | Region |
|---------|------------|------------|-------------|-------------|----------------|----------------|-----------|---------------|------------|--------|
| 649 | 14.09.2003 | 18:12 | 66 | 5.28 | 25 | 29.94 | 182 | 158.5 | - | DS |
| 650 | 14.09.2003 | 19:19 | 66 | 7.98 | 25 | 38.04 | 179 | 167.9 | - | DS |
| 651 | 14.09.2003 | 20:25 | 66 | 11.1 | 25 | 46.32 | 173 | 172.0 | - | DS |
| 652 | 14.09.2003 | 21:34 | 66 | 14.16 | 25 | 54.96 | 368 | 359.4 | + | DS |
| 653 | 14.09.2003 | 20:50 | 66 | 17.1 | 26 | 4.26 | 541 | 533.3 | + | DS |
| 654 | 15.09.2003 | 00:19 | 66 | 20.04 | 26 | 12.24 | 617 | 593.8 | + | DS |
| 655 | 15.09.2003 | 01:44 | 66 | 22.74 | 26 | 22.26 | 640 | 625.7 | + | DS |
| 656 | 15.09.2003 | 02:57 | 66 | 25.74 | 26 | 30.54 | 596 | 579.8 | + | DS |
| 657 | 15.09.2003 | 04:14 | 66 | 28.92 | 26 | 38.82 | 514 | 500.4 | + | DS |
| 658 | 15.09.2003 | 05:54 | 66 | 32.1 | 26 | 47.76 | 518 | 499.1 | + | DS |
| 659 | 15.09.2003 | 07:03 | 66 | 34.98 | 26 | 55.5 | 500 | 485.4 | + | DS |
| 660 | 15.09.2003 | 08:26 | 66 | 38.04 | 27 | 3.12 | 452 | 437.5 | + | DS |
| 661 | 15.09.2003 | 09:37 | 66 | 40.98 | 27 | 11.88 | 409 | 388.7 | + | DS |
| 662 | 15.09.2003 | 10:42 | 66 | 43.38 | 27 | 20.58 | 385 | 363.6 | + | DS |
| 663 | 15.09.2003 | 12:10 | 66 | 47.04 | 27 | 29.46 | 362 | 350.0 | + | DS |
| 664 | 15.09.2003 | 13:16 | 66 | 49.92 | 27 | 38.64 | 363 | 353.4 | + | DS |
| 665 | 15.09.2003 | 14:20 | 66 | 52.92 | 27 | 47.46 | 366 | 350.5 | + | DS |
| 666 | 15.09.2003 | 15:22 | 66 | 56.04 | 27 | 55.44 | 367 | 350.7 | + | DS |
| 667 | 15.09.2003 | 16:29 | 66 | 59.1 | 28 | 3.84 | 358 | 346.7 | + | DS |
| 668 | 15.09.2003 | 17:34 | 67 | 1.86 | 28 | 11.64 | 351 | 340.0 | + | DS |
| 669 | 15.09.2003 | 18:43 | 67 | 4.92 | 28 | 20.1 | 344 | 333.5 | + | DS |
| 670 | 15.09.2003 | 19:49 | 67 | 7.8 | 28 | 28.92 | 335 | 322.0 | + | DS |
| 671 | 15.09.2003 | 20:35 | 67 | 11.04 | 28 | 37.14 | 293 | 281.5 | + | DS |
| 672 | 15.09.2003 | 21:52 | 67 | 13.8 | 28 | 45.6 | 261 | 242.4 | + | DS |
| 673 | 15.09.2003 | 22:52 | 67 | 16.92 | 28 | 54.06 | 283 | 271.2 | + | DS |
| 674 | 15.09.2003 | 23:54 | 67 | 19.74 | 29 | 2.64 | 249 | 237.1 | + | DS |
| 675 | 16.09.2003 | 01:17 | 67 | 22.98 | 29 | 11.46 | 223 | 205.2 | - | DS |
| 676 | 16.09.2003 | 02:34 | 67 | 25.86 | 29 | 20.52 | 207 | 193.6 | - | DS |
| 677 | 16.09.2003 | 03:24 | 67 | 28.8 | 29 | 28.74 | 203 | 188.4 | - | DS |
| 678 | 16.09.2003 | 04:29 | 67 | 31.5 | 29 | 37.68 | 213 | 199.2 | - | DS |
| 679 | 16.09.2003 | 05:36 | 67 | 34.86 | 29 | 45.96 | 224 | 212.7 | - | DS |
| 680 | 16.09.2003 | 06:40 | 67 | 37.92 | 29 | 54.66 | 262 | 252.5 | - | DS |
| 681 | 16.09.2003 | 07:42 | 67 | 40.5 | 30 | 3 | 324 | 308.9 | - | DS |
| 682 | 16.09.2003 | 08:56 | 67 | 45.18 | 30 | 16.86 | 366 | 353.2 | - | DS |
| 683 | 16.09.2003 | 10:03 | 67 | 48.54 | 30 | 26.16 | 219 | 207.6 | - | DS |
| 684 | 18.09.2003 | 22:15 | 63 | 15.948 | 17 | 34.878 | 130 | 117.933 | + | IB |
| 685 | 18.09.2003 | 23:00 | 63 | 13.0038 | 17 | 30.0768 | 553 | 521.032 | + | IB |
| 686 | 19.09.2003 | 00:11 | 63 | 9.9756 | 17 | 24.8958 | 847 | 861.542 | + | IB |
| 687 | 19.09.2003 | 01:24 | 63 | 6.981 | 17 | 19.8822 | 1151 | 1156.031 | + | IB |
| 688 | 19.09.2003 | 02:47 | 63 | 3.0126 | 17 | 17.0322 | 1227 | 1228.010 | + | IB |
| 689 | 19.09.2003 | 04:26 | 62 | 58.896 | 17 | 9.828 | 1380 | 1383.40 | + | IB |
| 690 | 19.09.2003 | 06:04 | 62 | 54.942 | 17 | 4.878 | 1496 | 1499.1 | + | IB |
| 691 | 19.09.2003 | 07:52 | 62 | 51 | 16 | 57.3648 | 1607 | 1609.4 | + | IB |
| 692 | 19.09.2003 | 09:55 | 62 | 45.0054 | 16 | 50.0952 | 1745 | 1743.532 | + | IB |
| 693 | 19.09.2003 | 12:02 | 62 | 38.9916 | 16 | 41.0616 | 1874 | 1864.468 | + | IB |
| 694 | 19.09.2003 | 14:25 | 62 | 30.9828 | 16 | 31.0602 | 2044 | 2020.088 | + | IB |
| 695 | 19.09.2003 | 17:07 | 62 | 21.39 | 16 | 18.66 | 2086 | 2094.7 | + | IB |
| 696 | 19.09.2003 | 19:56 | 62 | 9.996 | 16 | 2.8752 | 2196 | 2199.60 | + | IB |
| 697 | 19.09.2003 | 23:08 | 61 | 57.0756 | 15 | 43.89 | 2256 | 2203.214 | + | IB |
| 698 | 20.09.2003 | 02:33 | 61 | 44.0478 | 15 | 25.908 | 2293 | 2293 | + | IB |
| 699 | 20.09.2003 | 06:10 | 61 | 35.043 | 15 | 1.8216 | 2099 | 2107 | + | IB |
| 700 | 20.09.2003 | 09:27 | 61 | 25.029 | 14 | 35.9046 | 2045 | 2041.675 | + | IB |

List of CTD / IADCP Stations POSEIDON 303/2

| Station | Date | Time (UTC) | ϕ (°N) | ϕ (°N) | λ (°W) | λ (°W) | Depth (m) | Max pressure | Instrument | Region |
|---------|------------|------------|-------------|-------------|----------------|----------------|-----------|--------------|------------|--------|
| 701 | 25.09.2003 | 07:29 | 62 | 17.1684 | 7 | 52.6818 | 100 | 52.5 | - | IFR |
| 702 | 25.09.2003 | 08:57 | 62 | 20.334 | 7 | 59.76 | 107 | 101.2 | - | IFR |
| 703 | 25.09.2003 | 10:06 | 62 | 24.1926 | 8 | 7.4256 | 134 | 127.518 | - | IFR |
| 704 | 25.09.2003 | 11:15 | 62 | 28.041 | 8 | 14.1504 | 202 | 182 | - | IFR |
| 705 | 25.09.2003 | 12:26 | 62 | 31.3764 | 8 | 22.0584 | 468 | 433 | + | IFR |
| 706 | 25.09.2003 | 13:57 | 62 | 35.5008 | 8 | 29.2068 | 495 | 486.8 | + | IFR |
| 707 | 25.09.2003 | 15:21 | 62 | 39.9288 | 8 | 36.6216 | 496 | 492 | + | IFR |
| 708 | 25.09.2003 | 17:03 | 62 | 43.6518 | 8 | 44.0898 | 501 | 495.419 | + | IFR |
| 709 | 25.09.2003 | 18:10 | 62 | 47.4024 | 8 | 49.71 | 494 | 487 | + | IFR |
| 710 | 25.09.2003 | 19:20 | 62 | 51.6414 | 8 | 55.377 | 426 | 420.667 | + | IFR |
| 711 | 25.09.2003 | 20:34 | 62 | 54.3894 | 9 | 2.7018 | 409 | 400.409 | + | IFR |
| 712 | 25.09.2003 | 21:44 | 62 | 56.1936 | 9 | 8.1096 | 418 | 412.072 | + | IFR |
| 713 | 25.09.2003 | 23:11 | 62 | 59.0976 | 9 | 17.5044 | 505 | 497.64 | + | IFR |
| 714 | 26.09.2003 | 00:36 | 63 | 1.608 | 9 | 26.7864 | 510 | 504.471 | + | IFR |
| 715 | 26.09.2003 | 02:01 | 63 | 4.71 | 9 | 35.9622 | 506 | 492.306 | + | IFR |
| 716 | 26.09.2003 | 03:22 | 63 | 7.8774 | 9 | 45.7758 | 487 | 481 | + | IFR |
| 717 | 26.09.2003 | 04:30 | 63 | 10.6902 | 9 | 55.0824 | 481 | 475 | + | IFR |
| 718 | 26.09.2003 | 05:55 | 63 | 14.1312 | 10 | 3.2526 | 435 | 426 | + | IFR |
| 719 | 26.09.2003 | 07:22 | 63 | 17.2308 | 10 | 18.4446 | 348 | 338.808 | + | IFR |
| 720 | 26.09.2003 | 09:14 | 63 | 17.3244 | 10 | 32.448 | 340 | 392.558 | + | IFR |
| 721 | 26.09.2003 | 11:02 | 63 | 16.9944 | 10 | 47.694 | 419 | 409.208 | + | IFR |
| 722 | 26.09.2003 | 12:15 | 63 | 20.028 | 10 | 56.013 | 424 | 420.058 | + | IFR |
| 723 | 26.09.2003 | 13:14 | 63 | 22.0764 | 11 | 0.3888 | 423 | 414.203 | + | IFR |
| 724 | 26.09.2003 | 14:41 | 63 | 24.6204 | 11 | 17.5734 | 330 | 321.035 | + | IFR |
| 725 | 26.09.2003 | 15:46 | 63 | 27.6606 | 11 | 26.6382 | 348 | 345.1 | + | IFR |
| 726 | 26.09.2003 | 16:47 | 63 | 31.2108 | 11 | 36.4614 | 375 | 368.4 | + | IFR |
| 727 | 26.09.2003 | 17:40 | 63 | 33.3672 | 11 | 44.3322 | 397 | 388.771 | + | IFR |
| 728 | 26.09.2003 | 18:53 | 63 | 39.1896 | 11 | 41.7162 | 392 | 384.984 | + | IFR |
| 729 | 26.09.2003 | 20:17 | 63 | 48.198 | 11 | 41.3394 | 373 | 364.623 | + | IFR |
| 730 | 26.09.2003 | 21:23 | 63 | 53.9316 | 11 | 41.0442 | 346 | 335.79 | + | IFR |
| 731 | 26.09.2003 | 22:42 | 64 | 1.794 | 11 | 40.5774 | 338 | 329.463 | + | IFR |
| 732 | 27.09.2003 | 00:10 | 64 | 8.7594 | 11 | 41.7036 | 312 | 305.165 | + | IFR |
| 733 | 27.09.2003 | 01:17 | 64 | 12.0114 | 11 | 50.346 | 374 | 369.862 | + | IFR |
| 734 | 27.09.2003 | 02:25 | 64 | 16.0602 | 11 | 58.716 | 415 | 411.007 | + | IFR |
| 735 | 27.09.2003 | 03:34 | 64 | 19.0962 | 12 | 6.5376 | 436 | 428.90 | + | IFR |
| 736 | 27.09.2003 | 04:45 | 64 | 22.2402 | 12 | 17.1558 | 447 | 432.03 | + | IFR |
| 737 | 27.09.2003 | 05:52 | 64 | 26.166 | 12 | 26.7312 | 198 | 181.65 | - | IFR |
| 738 | 27.09.2003 | 06:41 | 64 | 30.00 | 12 | 32.8512 | 179 | 171.2 | - | IFR |
| 739 | 27.09.2003 | 07:25 | 64 | 33.177 | 12 | 39.5256 | 160 | 150.618 | - | IFR |
| 740 | 27.09.2003 | 08:11 | 64 | 36.8514 | 12 | 46.092 | 181 | 171.23 | - | IFR |
| 741 | 27.09.2003 | 09:03 | 64 | 41.2722 | 12 | 52.4886 | 194 | 186.39 | - | IFR |
| 742 | 27.09.2003 | 09:54 | 64 | 45.0642 | 12 | 59.6082 | 156 | 148.414 | - | IFR |
| 743 | 28.09.2003 | 09:07 | 61 | 15.0276 | 14 | 12.0702 | 1848 | 1841 | + | IB |
| 744 | 28.09.2003 | 11:07 | 61 | 8.0112 | 13 | 52.5228 | 1769 | 1778.86 | + | IB |
| 745 | 28.09.2003 | 13:41 | 61 | 1.0842 | 13 | 33.1452 | 1698 | 1700.36 | + | IB |
| 746 | 28.09.2003 | 16:07 | 60 | 54.0606 | 13 | 14.4048 | 1754 | 1765 | + | IB |
| 747 | 28.09.2003 | 18:24 | 60 | 48.2136 | 12 | 59.3628 | 1267 | 1270 | + | IB |
| 748 | 28.09.2003 | 20:40 | 60 | 41.0748 | 12 | 43.0032 | 647 | 641.23 | + | LB |
| 749 | 28.09.2003 | 22:23 | 60 | 35.1504 | 12 | 27.0414 | 391 | 387.899 | + | LB |
| 750 | 28.09.2003 | 23:41 | 60 | 29.982 | 12 | 14.0676 | 343 | 333.425 | + | LB |
| 751 | 29.09.2003 | 02:02 | 60 | 34.014 | 11 | 39.7062 | 953 | 955.137 | + | LB |
| 752 | 29.09.2003 | 03:22 | 60 | 35.091 | 11 | 31.3296 | 1222 | 1211.6 | + | LB |
| 753 | 29.09.2003 | 04:51 | 60 | 36.1182 | 11 | 21.2808 | 1248 | 1242 | + | LB |

| Station | Date | Time (UTC) | ϕ (°N) | ϕ (°N) | λ (°W) | λ (°W) | Depth (m) | Max pressure | Instrument | Region |
|---------|------------|------------|-------------|-------------|----------------|----------------|-----------|--------------|------------|--------|
| 754 | 29.09.2003 | 06:21 | 60 | 37.3224 | 11 | 10.776 | 1027 | 1020 | + | LB BB |
| 755 | 29.09.2003 | 07:46 | 60 | 38.2608 | 11 | 43.794 | 505 | 504.663 | + | LB BB |
| 756 | 29.09.2003 | 10:23 | 60 | 40.7508 | 10 | 26.5476 | 146 | 137.448 | - | FB_cen |
| 757 | 29.09.2003 | 12:00 | 60 | 41.5326 | 9 | 58.2762 | 541 | 537.5 | + | FB_cen |
| 758 | 29.09.2003 | 13:37 | 60 | 41.196 | 9 | 45.093 | 639 | 639.89 | + | FB_cen |
| 759 | 29.09.2003 | 15:00 | 60 | 40.7646 | 9 | 32.8176 | 551 | 546 | + | FB_cen |
| 760 | 29.09.2003 | 17:00 | 60 | 40.8504 | 9 | 10.68 | 135 | 128 | - | FB_cen |
| 761 | 29.09.2003 | 19:07 | 60 | 53.1156 | 8 | 51.3918 | 100 | 93.607 | - | FB_cen |
| 762 | 29.09.2003 | 20:43 | 61 | 4.9896 | 8 | 39.9276 | 109 | 100.315 | - | FB_cen |
| 763 | 29.09.2003 | 22:10 | 61 | 15.9972 | 8 | 30.6684 | 210 | 192.342 | - | FB_cen |
| 764 | 29.09.2003 | 22:58 | 61 | 17.8434 | 8 | 26.9808 | 336 | 331.40 | + | FB_cen |
| 765 | 29.09.2003 | 23:50 | 61 | 20.8794 | 8 | 23.673 | 428 | 427.134 | + | FB_cen |
| 766 | 30.09.2003 | 00:38 | 61 | 22.6926 | 8 | 20.32980 | 636 | 627.128 | + | FB_cen |
| 767 | 30.09.2003 | 01:48 | 61 | 25.4412 | 8 | 18.83740 | 804 | 786 | + | FB_cen |
| 768 | 30.09.2003 | 03:25 | 61 | 24.8442 | 8 | 14.925 | 641 | 640 | + | FB_cen |
| 769 | 30.09.2003 | 04:41 | 61 | 29.7384 | 8 | 12.8886 | 443 | 449 | + | FB_cen |
| 770 | 30.09.2003 | 05:42 | 61 | 33.012 | 8 | 9.1218 | 277 | 272 | + | FB_cen |
| 771 | 30.09.2003 | 06:27 | 61 | 34.9398 | 8 | 6.0042 | 308 | 303 | + | FB_cen |
| 772 | 30.09.2003 | 07:25 | 61 | 37.065 | 8 | 3.4806 | 281 | 268.877 | + | FB_cen |
| 773 | 30.09.2003 | 08:06 | 61 | 40.0812 | 8 | 0.3228 | 204 | 183.606 | - | FB_cen |
| 774 | 30.09.2003 | 11:39 | 62 | 0.2748 | 8 | 55.3458 | 435 | 425.173 | + | FB_ex |
| 775 | 30.09.2003 | 12:57 | 61 | 57.3348 | 8 | 54.5952 | 454 | 450.219 | + | FB_ex |
| 776 | 30.09.2003 | 13:56 | 61 | 54.1146 | 8 | 55.3266 | 506 | 500.109 | + | FB_ex |
| 777 | 30.09.2003 | 14:59 | 61 | 50.853 | 8 | 55.0482 | 555 | 549 | + | FB_ex |
| 778 | 30.09.2003 | 16:10 | 61 | 47.8608 | 8 | 54.4434 | 650 | 644 | + | FB_ex |
| 779 | 30.09.2003 | 17:24 | 61 | 45.0834 | 8 | 55.5882 | 745 | 738.085 | + | FB_ex |
| 780 | 30.09.2003 | 18:38 | 61 | 42.0222 | 8 | 55.3194 | 862 | 856.417 | + | FB_ex |
| 781 | 30.09.2003 | 20:00 | 61 | 39.0372 | 8 | 55.0938 | 859 | 852.3 | + | FB_ex |
| 782 | 30.09.2003 | 21:15 | 61 | 36.063 | 8 | 55.2312 | 814 | 806.204 | + | FB_ex |
| 783 | 30.09.2003 | 22:28 | 61 | 33.0552 | 8 | 54.8778 | 661 | 656.779 | + | FB_ex |
| 784 | 30.09.2003 | 23:33 | 61 | 29.8908 | 8 | 54.6222 | 493 | 490.083 | + | FB_ex |
| 785 | 01.10.2003 | 01:58 | 61 | 25.9554 | 8 | 17.898 | 803 | 790.038 | + | FB_ex |
| 786 | 01.10.2003 | 08:54 | 61 | 3.183 | 7 | 4.4076 | 266 | 259.180 | + | FB_en |
| 787 | 01.10.2003 | 09:33 | 61 | 3.0906 | 7 | 8.0616 | 385 | 378.662 | + | FB_en |
| 788 | 01.10.2003 | 10:22 | 61 | 3.0612 | 7 | 11.844 | 528 | 522.7331 | + | FB_en |
| 789 | 01.10.2003 | 11:15 | 61 | 3.3798 | 7 | 22.0638 | 689 | 670.585 | + | FB_en |
| 790 | 01.10.2003 | 12:23 | 61 | 3.162 | 7 | 19.5978 | 787 | 773.819 | + | FB_en |
| 791 | 01.10.2003 | 13:32 | 61 | 3.1392 | 7 | 23.145 | 834 | 819.892 | + | FB_en |
| 792 | 01.10.2003 | 14:44 | 61 | 2.973 | 7 | 27.5052 | 858 | 845.9 | + | FB_en |
| 793 | 01.10.2003 | 15:53 | 61 | 2.997 | 7 | 31.5942 | 874 | 863.05 | + | FB_en |
| 794 | 01.10.2003 | 16:58 | 61 | 2.8938 | 7 | 35.931 | 897 | 886.617 | + | FB_en |
| 795 | 01.10.2003 | 18:19 | 61 | 2.8626 | 7 | 39.6594 | 922 | 910.626 | + | FB_en |
| 796 | 01.10.2003 | 19:29 | 61 | 2.9346 | 7 | 43.8612 | 932 | 920.606 | + | FB_en |
| 797 | 01.10.2003 | 20:39 | 61 | 2.9964 | 7 | 47.9958 | 804 | 798.579 | + | FB_en |
| 798 | 01.10.2003 | 21:44 | 61 | 3.0774 | 7 | 51.957 | 470 | 466.742 | + | FB_en |
| 799 | 01.10.2003 | 22:32 | 61 | 2.994 | 7 | 55.9074 | 213 | 208.63 | - | FB_en |
| 800 | 02.10.2003 | 03:47 | 60 | 29.1348 | 8 | 50.3988 | 262 | 250 | + | WTR |
| 801 | 02.10.2003 | 05:04 | 60 | 25.9092 | 8 | 37.8264 | 471 | 465 | + | WTR |
| 802 | 02.10.2003 | 06:32 | 60 | 22.887 | 8 | 25.8816 | 566 | 559 | + | WTR |
| 803 | 02.10.2003 | 07:37 | 60 | 19.7394 | 8 | 13.3632 | 516 | 508.319 | + | WTR |
| 804 | 02.10.2003 | 08:55 | 60 | 17.0178 | 8 | 2.0358 | 542 | 535.068 | + | WTR |
| 805 | 02.10.2003 | 10:18 | 60 | 13.8864 | 7 | 48.6132 | 607 | 607.211 | + | WTR |
| 806 | 02.10.2003 | 14:30 | 60 | 11.3796 | 7 | 38.2134 | 575 | ----- | - | WTR |
| 807 | 02.10.2003 | 16:35 | 60 | 8.1924 | 7 | 24.7224 | 530 | ----- | - | WTR |
| 808 | 02.10.2003 | 17:58 | 60 | 4.7958 | 7 | 12.9276 | 502 | ----- | - | WTR |
| 809 | 02.10.2003 | 19:17 | 60 | 2.0022 | 6 | 59.8086 | 472 | ----- | - | WTR |

| Station | Date | Time (UTC) | ϕ (°N) | ϕ (‘N) | λ (°W) | λ (‘W) | Depth (m) | Max pressure | Instrument | Region |
|---------|------------|------------|-------------|-------------|----------------|----------------|-----------|--------------|------------|--------|
| 810 | 02.10.2003 | 20:25 | 59 | 58.9992 | 6 | 47.7972 | 447 | 441 | - | WTR |
| 811 | 02.10.2003 | 21:32 | 59 | 56.0034 | 6 | 35.8458 | 330 | 317.253 | - | WTR |
| 812 | 02.10.2003 | 22:43 | 59 | 53.1534 | 6 | 23.7744 | 423 | 408.629 | - | WTR |
| 813 | 02.10.2003 | 23:40 | 59 | 50.2356 | 6 | 11.0004 | 473 | 469.338 | - | WTR |
| 814 | 03.10.2003 | 00:53 | 59 | 47.1342 | 5 | 59.4492 | 359 | 355.005 | - | WTR |
| 815 | 03.10.2003 | 02:02 | 59 | 44.2146 | 5 | 47.553 | 332 | 335.401 | - | WTR |

WTR: Wyville Thomson Ridge

IB: Iceland Basin

LB: Lousy Bank

LB BB: Lousy Bank – Bill Bailey’s Bank

IFR: Iceland Færoe Ridge

FB_en: Færoe Bank Channel entry

FB_ex: Færoe Bank Channel exit

FB_cen: central Færoe Bank Channel

+: CTD/IADCP, -: CTD

1. Aims of the cruise

RV POSEIDON cruise 303, legs 1 - 2 were carried out by the Institut für Meereskunde of the University of Hamburg. Students from the Institut für Umweltphysik of the University of Bremen and from the Niels Bohr Institutet for Astronomi, Fysik og Geofysik of the University of Copenhagen also participated.

The cruise had two main objectives:

- to educate undergraduate students in the handling of oceanographic instrumentation and in the collection and analysis of field data,
- to map the cold overflow to the North Atlantic and the warm inflow to the Nordic Seas over the ridge system between Greenland and Scotland, through Denmark Strait, across the Iceland Faroe Ridge, through the Faroe-Bank Channel, and across the Wyville Thomson Ridge and to study its variability.

The planning and preparation of the cruise involved the participating students and was carried out during seminars at the participating universities. Following a review of the recent literature, an analysis of historical data and the experience made during previous student cruises the observational programme was designed. Hydrographic stations were occupied along several sections crossing the in- and overflow. The University of Hamburg financed the experiment.

2. Narrative

Leg 1

Thursday 11.9. 2003:

Noon position: Reykjavik

Air temperature: 11.1° C, wind: S 3 Bft, air pressure: 989.5 hPa

The scientific crew of RV POSEIDON cruise 303 arrived on Monday evening, 10.9.2003. In the morning of 11th we started with the installation of our equipment. This work continued until the late evening hours. During the afternoon the students from Bremen and Copenhagen arrived at Poseidon. Due to the bad weather and the bad weather forecast we decided to postpone the departure to the next day.

Friday 12.9.2003:

Noon position: Reykjavik

Air temperature: 12.9 °C, wind: S 3 Bft, air pressure: 1002. hPa

In the morning the students got a safety instruction by the first mate. Additionally, we calibrated the compass of the IADCP. This had to be done on land in order to avoid incorrect data biased by the iron hull. Finally, at 12:30 we left to Denmark Strait where we wanted to repeat the section of Poseidon cruise 294. The weather forecast was still bad, but during the afternoon the weather became better. Some of the students got seasick as soon as we left the harbour. Until the late evening hours we worked on the CTD and IADCP to get them running.

Saturday 13.9.2003:

Noon position: 66° 10,3'N 24°22,3' W

Air temperature: 10.1 °C, wind: ENE 7 Bft, air pressure: 984 hPa

At 8:00 we reached the first station of our Denmark Strait section, but the weather and the swell was so bad that we had to return to the western Icelandic coast where we found shelter in a fjord. According to the forecast the low pressure system should be weakened by Monday and we decided to stay in the fjord until Sunday. In shelter of the coast the students recreated from their seasickness and were again able to take part in the social life onboard.

Sunday 14.9.2003:

Noon position: 66° 13,64'N 23°57,14' W

Air temperature: 8 °C, wind: NNE 6 Bft, air pressure: 997 hPa

In the morning wind and swell had already weakened and we sailed back to our first station of the Denmark Strait section. The students had a seminar in the morning discussing the objectives of the cruise. We reached the first station (Nr.649) at 18:00. During the night the measurements were carried out without any problems and additionally, we had a wonderful sight of Mars and on polar lights.

Monday 15.9.2003:

Noon position: 66° 47,0' N 27° 29,60'W

Air temperature: 5.4°C, wind: SW 4 Bft, air pressure: 1006 hPa

The weather was fine and work was proceeding without any problems, but we were running a little behind schedule. Early in the evening we reached the 18th station (666). An iceberg was spotted at far distance and a family of Orcas were sighted in the morning. Due to the rough sea the ship was rolling hard, which kept everyone awake during night, even those who were not on shift.

Tuesday 16.9.2003

Noon position: 67° 33,63'N 30°19,80'W

Air temperature: 3°C, wind: ENE 5 Bft, air pressure: 1009 hPa

The last station of the Denmark Strait section was completed at about 11:00, and during the morning hours the shifts enjoyed the view of the Greenland coast and icebergs in the rising sun. The students started work on the data analysis of the Denmark Strait section and in the afternoon they got courses in navigation and how to tie knots. We started steaming south-eastward to the other side of Iceland, where we are planning to continue with a section through the Iceland Basin.

Wednesday 17.9.2003

Noon position: 64°08,04'N 26°04,44'W

Air temperature: 9.6°C, wind: NE-E 6Bft, air pressure: 1008 hPa

We were still steaming to our next section in the Iceland basin. The students continued with the data analysis of the Denmark Strait section and additionally, they prepared the detailed positions for the next stations of the Iceland basin section. During the morning

the ship crew exercised a fire alarm drill and the scientific crew saw a video about fire prevention onboard. During night the weather got worse.

Thursday 18.9.2003

Noon position: 63° 12,90'N 20°49,7'W

Air temperature: 4,7°C, wind: N-E 7 Bft, air pressure: 1015 hPa

During the day we were still steaming to the next section. The day was spent with seminars and the Denmark Strait data analysis. We arrived at 23:00 and began the work at the first station (Nr. 684) of the Iceland basin section.

Friday 19.9.2003

Noon position: 62° 44,96'N 16° 50,32'W

Air temperature: 8,3°C, wind: W 4Bft, air pressure: 1021 hPa

Work proceeded without any problems during the day. The data analysis of the Denmark Strait section (first draft) was finished and the students started with writing down their results.

Saturday 20.9.2003

Noon position: 61°24,68'N 14°35,10'W

Air temperature: 10.3°C, wind: SW 7 Bft, air pressure: 1013 hPa

The weather was getting worse again and we had to stop the measurements at approximately 14:00 after we arrived at the position of station 701. In the evening the wind reached 9 Bft occasionally and wave heights increased to 8 m. We decided to steam to the Faeroe Islands, as the weather forecast for the next day was not promising.

Sunday 21.9.2003

Noon position: 61°01,37'N 8°12,11'W

Air temperature: 10.7°C, wind: W to SW 8 to 9 Bft, air pressure: 995 hPa

The weather and the forecast were still bad and we decided to run into Tórshavn port as it seemed more than unlikely that we will be able to run one more station. The students were still busy with their data report and in the evening a final seminar was carried out.

Monday, 22.9.2003

Noon position: Tórshavn

Air temperature: 7,4°C, wind: N to W 6 Bft, air pressure: 996 hPa

We arrived at Tórshavn at 9:00 in the morning. After cleaning the laboratories and the cabins the students left the ship for exploring the tourist attractions of the town and the neighbourhood. In the evening the end of leg 1 was celebrated with a spontaneous party visited also by members of the ship crew.

Tuesday, 23.9.2003

Noon position: Tórshavn

Air temperature: 3.7°C, wind: NW 3 Bft, air pressure: 1010

The students departed for their flights at 8:30. In the morning we changed the batteries of the IADCP and therefore, a new calibration of the IADCP compass had to be carried out. The weather was nice and we spent the rest of the afternoon with fishing and enjoying the sun.

Leg 2

Wednesday, 24.09.2003

Noon position: Tórshavn

Air temperature: 10.8°C, wind: W 4 Bft, air pressure: 1005.5 hPa

The second student group arrived during the day. RV Posidon departed Tórshavn at 20:00, heading for station number 701, at the Iceland-Faeroe Ridge, the expected arrival time is 08:00, 25.09. After the departure the students had a safety-instruction meeting. The weather forecasts for the next couple of days is good.

Thursday, 25.09.2003

Noon position: 62°27,18' N 008°13,27'W

Air temperature: 8°C, wind: E 4-5 Bft, air pressure: 1011 hPa

We arrived at station 701, the first station on leg 2, at 08:00. At station the students received an introduction to the equipment used for measuring, including a demonstration of the rosette. After the introduction the scientific crew started with the watch schedule. The work proceeded all day although the wind increased to 7 Bft occasionally and the swell let the ship roll hard during stations. In the evening the students had a meeting where they discussed the goals and the expectations of the work onboard. The first tasks were delegated to the students.

Friday, 26.09.2003

Noon position: 63°17,00' N 010°48,30'W

Air temperature: 6.3°C, wind: varying directions 2 Bft, air pressure : 1020.4 hPa

The wind had decreased and so had the sea and in the morning we had a nice sunrise. The good mood at the start of the day lasted, and also the work progressed on schedule. At the evening meeting the students discussed the weather forecast and its influence on the schedule. But so far everything looks promising.

Saturday, 27.09.2003

Noon position: 64°38,64' N 013°02,05'W

Air temperature: 7.2°C, wind: SSW 3 Bft, air pressure : 1015.2 hPa

This morning we finished the first section of leg 2 and we were rewarded with a wonderful view on the Icelandic coastline. The vessel is now proceeding to the next station, which is the station, where the previous group had to cut off due to bad weather conditions. The expected arrival time to the next station (743) is 08:00, 28.09. Meanwhile we were analysing the data we got so far. Additionally, the students had a navigation course, and a course on knots. In the evening whales were sighted.

Sunday, 28.09.2003

Noon position: 61°08,51' N 013°53,31'W

Air temperature: 10,2°C, wind: SSW 4 Bft, air pressure : 1004,5 hPa

After a night without shifts, everybody was joining breakfast in the mess. The measurements started again at 10:30 on the Iceland basin section. Work proceeded without any problems. Also the weather forecasts for the next days look fine. At 11:00 we had our traditional “church” and enjoyed a glass of Sherry before lunch. The students were all busy the whole day occupying all computers onboard in order to proceed with the data analysis.

Monday, 29.09.2003

Noon position: 61°41,1' N 010°20,3'W

Air temperature: 10,5°C, wind: NW 3 Bft, air pressure : 999,9 hPa

Though it was a rainy morning it became one of the best days so far, weather regarding, with sunshine, light winds and smooth waters and some of us even had the chance to see a group of whales passing by in the afternoon. The altimeter is now and then suffering from functional problems and the ship's ADCP had problems with data transmission which also lead to a malfunctioning daughter of the gyro compass in the laboratory. But altogether work proceeded satisfying.

Tuesday, 30.09.2003

Noon position: 61°56,67' N 008°44,64'W

Air temperature: 10,0°C, wind: ESE 4 Bft., air pressure : 1012,4 hPa

In the morning we finished the Iceland basin section on the shallow banks of Bailey and continued with our measurements on the Faeroe Bank Channel. At night we saw some kind of pipefish, which was attracted to the light from the vessel. The weather was again sunny and nice. The students show now appearance of fatigue from all the work and unfamiliar life onboard.

Wednesday, 01.10.2003

Noon position: 61°03,11' N 007°13,39'W

Air temperature: 11,0°C, wind: W 4 Bft., air pressure : 1011,4 hPa

During the night we finished the first (central) of the three sections of the Faeroe Bank Channel and steamed for the next located at the exit. Meanwhile, we found out that the IADCP data of the deepest stations of the central section were incorrect. So, we decided to rerun the deepest station in order to recover some IADCP data for this specific area. Later on, we continued as planned. In the morning the AB's shortened the conducting wire for the CDT by 600 meters, as it was used up and during night on the steaming distance we changed once again the batteries of the IADCPs. It was a cloudy day, but we didn't mind anyway, we had plenty work to do indoor, at the computers.

Thursday, 02.10.2003

Position: 60°23,64' N 007°47,90'W

Air temperature: 10,5°C, wind: SW 7 Bft., air pressure : 999,1 hPa

In the morning the wind increased and before noon we had to stop running stations, due to safety, when the vessel was taking water on deck. Unfortunately a little bird which was

resting on deck didn't notice the danger and was flushed into the sea. In the afternoon weather permitted us to continue the station work. From here on we did the stations only with the CTD running , no bottles, no IADCP, thus minimising the risk of damaging the rosette, due to the bad weather we experienced.

Friday, 03.10.2003

Noon position: 58°41,65' N 005°32,55'W

Air temperature: 11,1°C, wind: WNW 7-8 Bft., air pressure : 1001,2 hPa

We finished this leg's last station at 05:30 and this in pretty bad weather, having a combined sea and swell that exceeded by far, what we had expected from the weather forecasts received. So the students who were asleep were bumping around in their bunks, for the first time on this leg, experiencing the North Atlantic Sea's true nature. After breakfast some of the students worked on making a post buoy which should carry our greetings to friends and family ashore. We reached the Hebrides around 15:00 and in the evening we launched the post buoy and watched its disappearance in the horizon behind.

Saturday, 04.10.2003

Noon position: 55°35,33' N 008°45,74'W

Air temp:9,7°C, wind: NNW 7 Bft., air pressure : 1016,6 hPa

The whole day the students were working on their final report. The weather was still quite windy, and we experienced a rough sea again. In the late evening the last and final edition of the student's report was finished, and was celebrated with some beers. The cleanup of this cruise started already in the night by saving all data on CD and removing the files from the computers.

Sunday 05.10.2003

Noon position : Approaching to Galway.

The whole morning everybody was busy packing and cleaning the laboratories. Shortly, after lunch we arrived at Galway harbor and POSEIDON cruise 303 ended.

3. Cruise participants

Leg 1, 11.- 23. September 2003

| | | |
|--------------------|-----------------|---------|
| Dagmar Hainbucher | Chief Scientist | IfM |
| Detlef Quadfasel | Scientist | IfM |
| Stiig Wilkenskjeld | Scientist | IfM |
| Brian Hansen | Student | NBIAFoG |
| Waleid Hassan | Student | IUP |
| Marco Langer | Student | IUP |
| Sisse Lundholm | Student | NBIAFoG |
| Christian Meißner | Student | IUP |
| Horst Wohlrab | Student | IfM |

| | | |
|---------------------------|-----------------|---------|
| Dagmar Hainbucher | Chief Scientist | IfM |
| Detlef Quadfasel | Scientist | IfM |
| Martin Vogt | Student | IfM |
| Martin Endrulat | Student | IfM |
| Kari Guddal | Student | NBIAFoG |
| Stephanie Preißler | Student | IfM |
| Kirstin Rolle | Student | IfM |
| Gitte Sveigaard Holmsberg | Student | NBIAFoG |
| Katrin Uhlmann | Student | IfM |
| Nina Wilkens | Student | IfM |

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4. Technical information

CTD/Rosette

Altogether 167 full depth standard hydrographic stations were occupied during the cruise, employing a SeaBird SBE911plus CTD-O2 sonde, attached to a SeaBird carousel 12 bottle water sampler. Profiles were run to within 5-10 m of the bottom. At mostly all stations water samples were taken from 3 depth levels evenly distributed within the water column. The water samples were analysed onboard for salinity, using a Guildline Autosol salinometer. One of the water bottles was also equipped with reversing digital thermometers, providing temperature and pressure check values for the CTD sensors.

Lowered Acoustic Doppler Current Profiler

Vertical profiles of horizontal currents were made with a LADCP-2 system attached to the rosette water sampler. The system consists of two ADCPs of the Workhorse type (WHM300) manufactured by RD Instruments. They operate at a frequency of 300 kHz. The data were analysed with software provided by the University of Bremen, Germany.

Surface temperature and salinity

Underway temperature and salinity measurements were made with a SeaBird thermo-salinograph installed in the ship's port well.

Current measurements

Underway current measurements were taken with a RDI 150 kHz acoustic Doppler Current Profiler, covering approximately the top 200 m of the water column. The transducers were installed in the starboard ship's well.

5. Preliminary results

The results presented here were compiled by the students during the course of the cruise and can, in a slightly different form, also be seen on their WEB page under www.ifm.uni-hamburg.de. The data used for producing these results are not calibrated.

Water mass exchange through Denmark Strait

The conditions in the Denmark Strait can be described as follows:

There are three principal water masses associated with two main currents.

1. The Irminger Current is characterised by relative warm and saline water and flows northward at the eastern part of the Greenland-Iceland section (western coast of Iceland). Near the surface we found high temperatures of 9° C to 10° C and in the deeper parts of the Irminger Current (up to 400m depth) the temperature varied from 6° C to 8 ° C (fig. 2a). The salinity of the Irminger Current was high, varying from 34.9 to 35.2 psu (fig. 2b).
2. The East Greenland Current can be divided into two layers: the upper layer and the overflow. The upper layer (up to 200m) is characterised by a low temperature ranging from 0° C to 2° C and a low salinity between 33 and 34.5 psu, while the temperature of the overflow varies between the freezing point and 0° C (fig. 2a), and the salinity is about 34.8 psu (fig. 2b).

In the hydrographic section the three water masses can easily be distinguished. In the salinity and the density distributions, the sharp boundary between the Irminger Current and the East Greenland Current can be identified. This boundary is located over the continental slope of Iceland at the eastern part of the deeper passage. In the upper 200m the distribution of the salinity and temperature are highly variable due to the high stirring and mixing activities, which result from the meso-scale eddies passing through the Denmark Strait. These eddies can be clearly identified from the density distribution of the section.

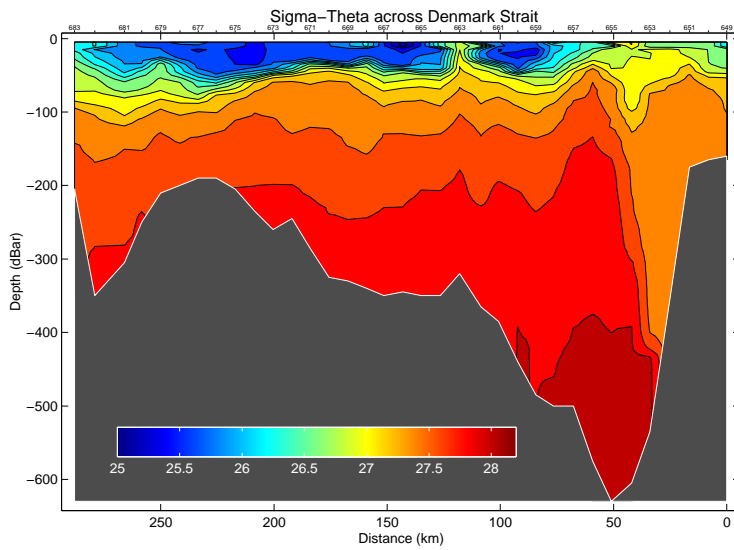
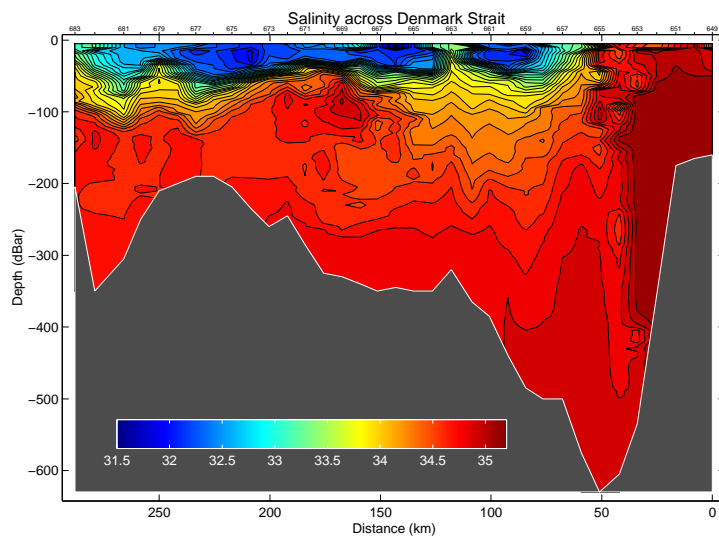
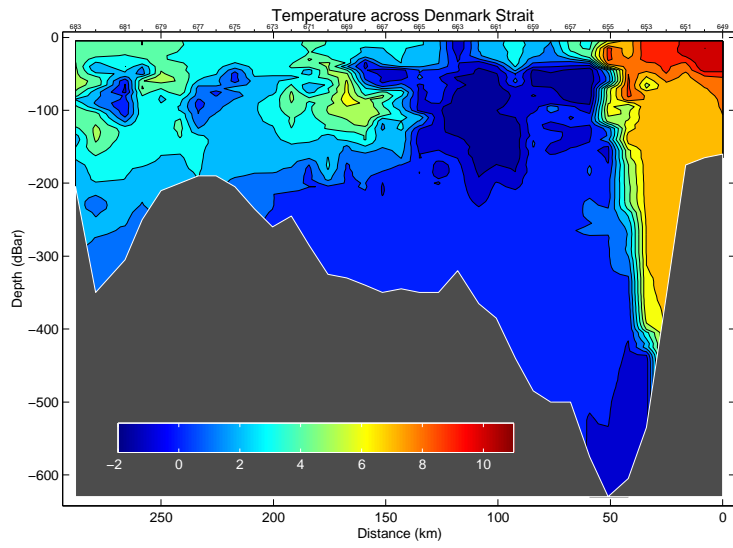


Figure 2: a) Temperature-distribution along the Denmark Strait section.
 b) Salinity- distribution along the Denmark Strait section.
 c) Potential density-distribution along the Denmark Strait section.

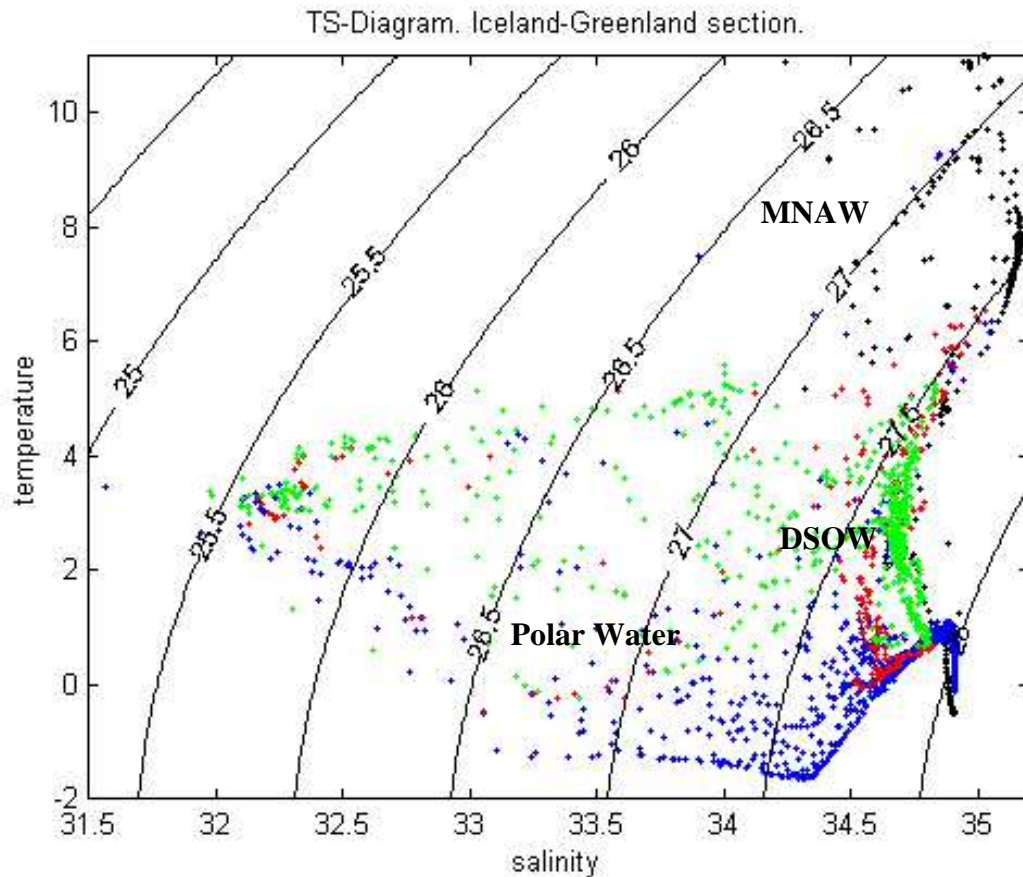


Figure 3: TS-Diagram for the main three water masses in Denmark Strait

black: stations 649 - 653 blue: stations 654 - 667
 red: stations 668 - 672 green: stations 673 - 683

Figure 3 shows the TS diagram for the Denmark Strait. The Modified North Atlantic Water (MNAW) has a temperature of 6-8° C and a salinity of about 35 psu. The Polar Water is characterised by a temperature of about -1° C down to the freezing point and a salinity lower than 34.5 psu. The Denmark Strait Overflow Water (DSOW) is described by a temperature between -0.5° C and 0.5° C and a salinity between 34.7 and 35 psu.

The calculation of the geostrophic velocity (fig. 4) is carried out by defining a level of no motion at the bottom. It seems that there is a strong shear at the eastern part of the section, while the western part has a very low shear. However the assumption of zero level is not valid for the Denmark Strait, since there is a strong barotropic flow component (fig. 5).

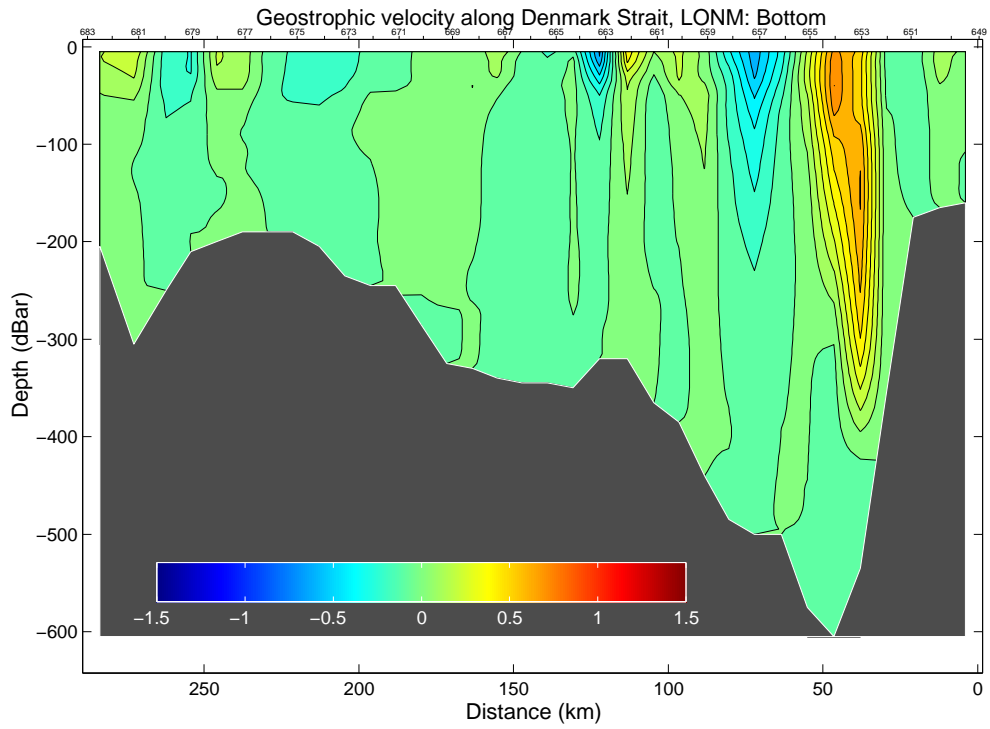


Figure 4: Distribution of geostrophical velocity over the cross-section (zero level at the bottom, m/s)

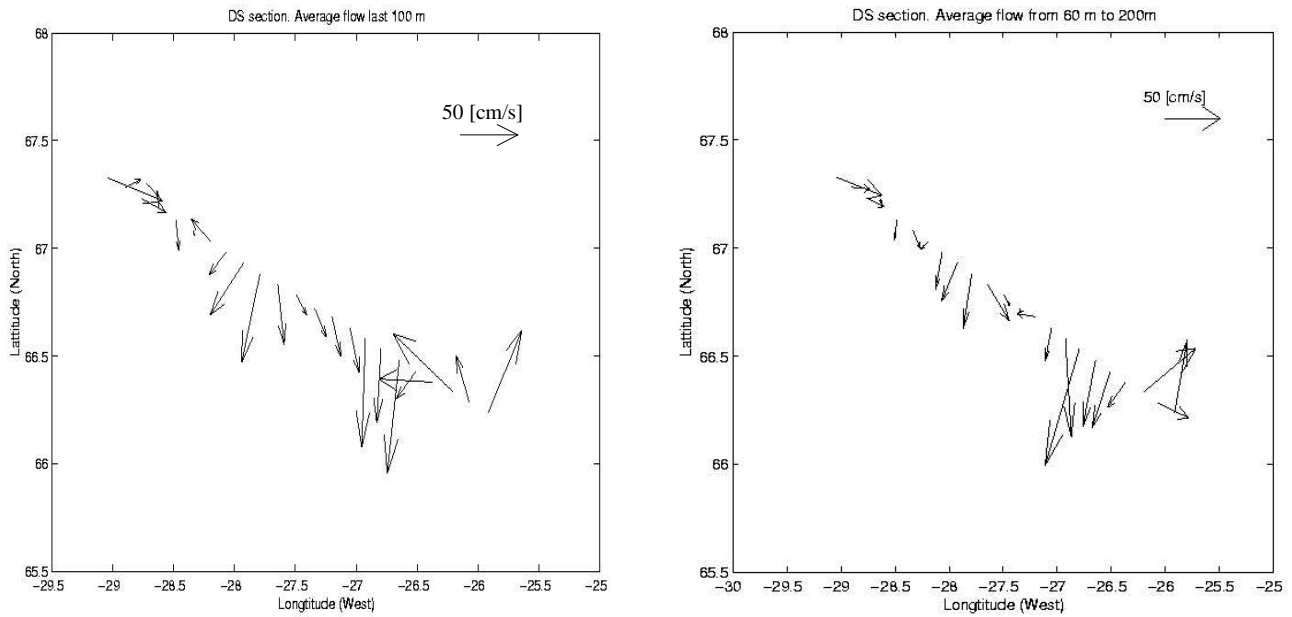


Figure 5: average current-velocity in the Denmark Strait
a) Last 100m to the bottom

b) from 60m to 200m

Conclusions:

- Water in the Denmark Strait consists of three basic water masses and mixtures between them.
- The boundary between Polar- and Atlantic Water is located to the east of the strait.
- There is evidence for strong eddy-activity (salinity-variability).

Water mass exchange through the Iceland Basin Section

Stations 684-699 and 743-747, the IB section, cover a distance of 330 sm and were taken across the northern part of the Iceland Basin.

A steep continental slope forms the western boundary of the IB section, followed by an abyssal plain in the central part with the deepest area being about 2400 meters. The Iceland Faroe Ridge forms the northern borderline of the whole basin and is situated parallel to the IB section. The IB section is limited in the east by the steep slope to the shelf of Lousy Bank.

The deep overflow waters in the Iceland basin enter mainly from two areas: across the Iceland Faroe Ridge, which has a sill level between 420 and 520 meters and across the Faroe Bank Channel which has a sill depth of 840 meters.

From the topographical structure, the basin's geographical location, earth rotation and the basin width exceeding the Rossby radius, a south-westward boundary current of overflow water along the Icelandic coast and a north-eastward flow of Modified North Atlantic Water in the eastern part can be expected.

The relevant water masses in the Iceland basin are (Hansen and Østerhus, Progress in Oceanography/45 [2000],109-208):

| Name | Potential temperature | Salinity | Origin |
|------|--------------------------|----------|----------------|
| MNAW | >7°C | >35.2 | North Atlantic |
| OW | <3°C | ~34.98 | Nordic Seas |
| LBW | ~3°C | ~34.9 | Labrador Sea |
| SURF | >10°C | <35.3 | Iceland Basin |

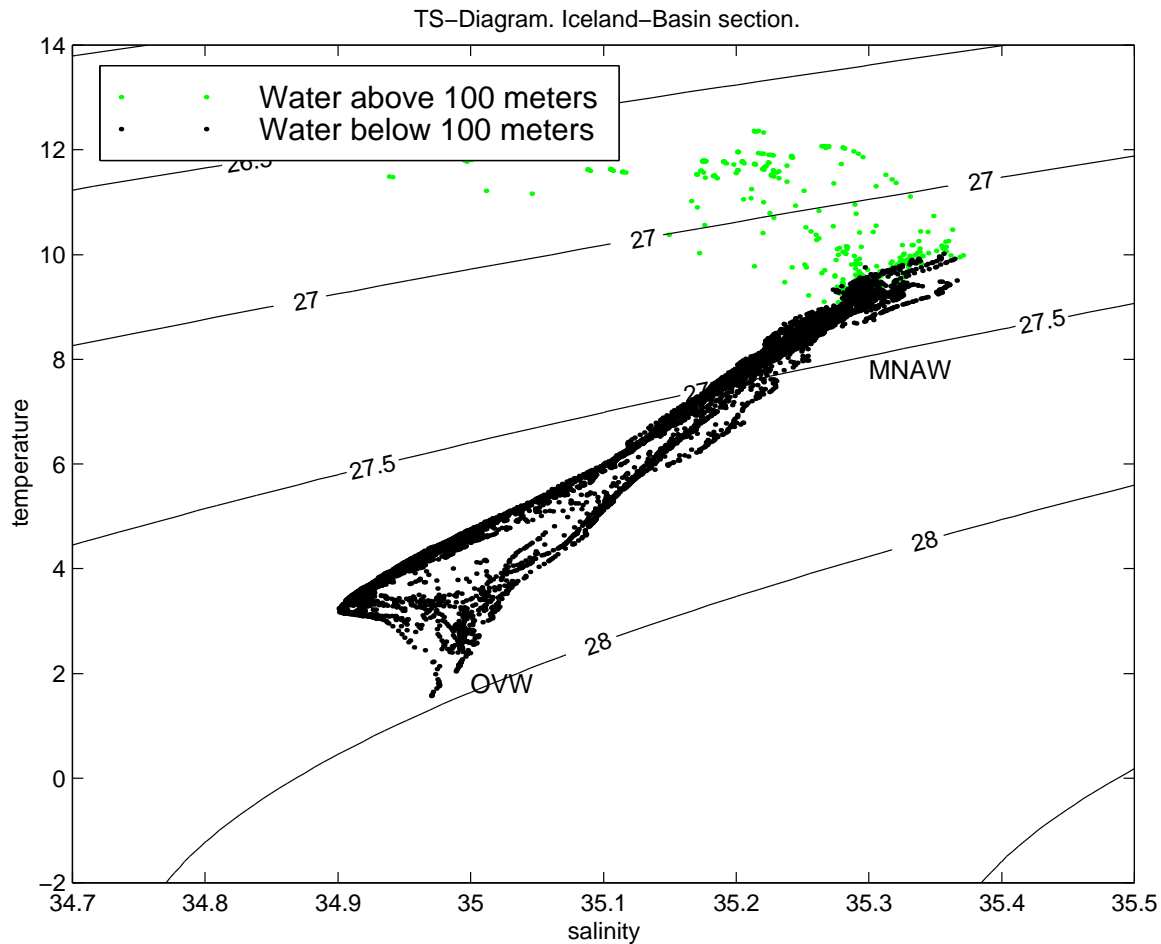


Figure 6: TS-Diagram of the Iceland Basin Section.

From the TS-Diagram (fig. 6) it is obvious that in the basin there are mainly three water masses:

- 1) cold and fresh Labrador Seawater (LBW)
- 2) the warmer and saline Modified North Atlantic Seawater (MNAW) and
- 3) cold overflow water from the Nordic Seas (OW).
- 4) However, there is a fourth, less saline and relatively warm water mass present in the surface, which is due to rain, continental runoff and seasonal warming.

The main structure of the spreading indicates that mixing is only taking place between OW and LBW or LBW and MNAW or OW and MNAW. Hence, there is only little water inside the triangular frame of mixing.

Comparing the water characteristics of the measurements along the IFR and the FBC with the overflow water of the IB, overflow water with the same characteristics can be found in all three sections. But, in the IB there is no water with potential temperatures below 1.0 °C due to the fact that the overflow water in the IB has already mixed with MNAW during its sinking down into the deep basin. Additionally, comparing the water characteristics of the IB section with the WTR section yield the conclusion that no deep water from the Wyville Thomson Ridge entered the Iceland Basin.

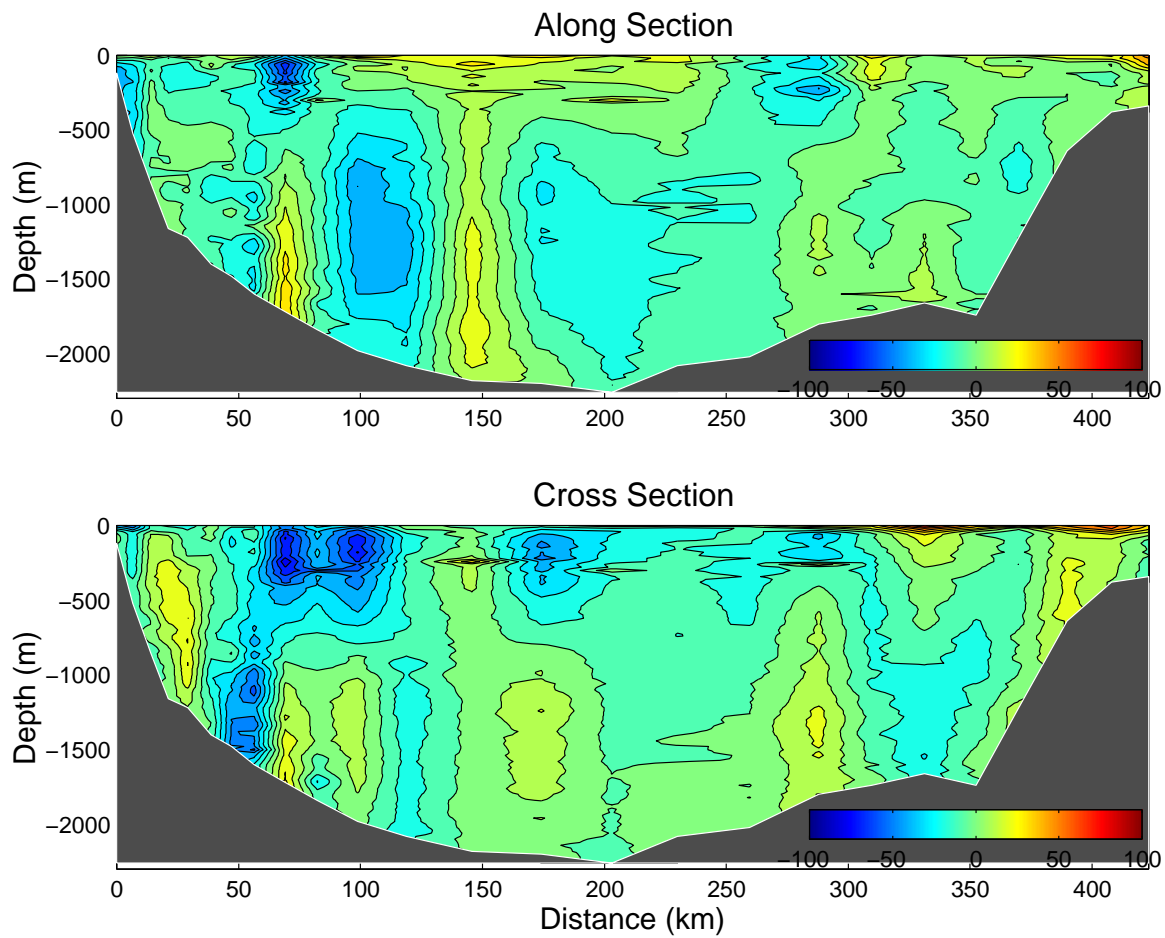


Figure 7: Velocity derived from LADCP data of the Iceland Basin section (cm/s).

The LADCP data (fig. 7) enables a view on the shear in the interior of the IB section. In the western part of the basin, the south component (cross section) is compared to the rest, distinctly strong. A weaker northward flow exists in the eastern part of the section. In the along section a westerly flow is indicated along the western part of the section and together with the findings of the cross section it confirms the existence of a deep boundary current due to geostrophic shear. In general, eddies are overlying the main flow.

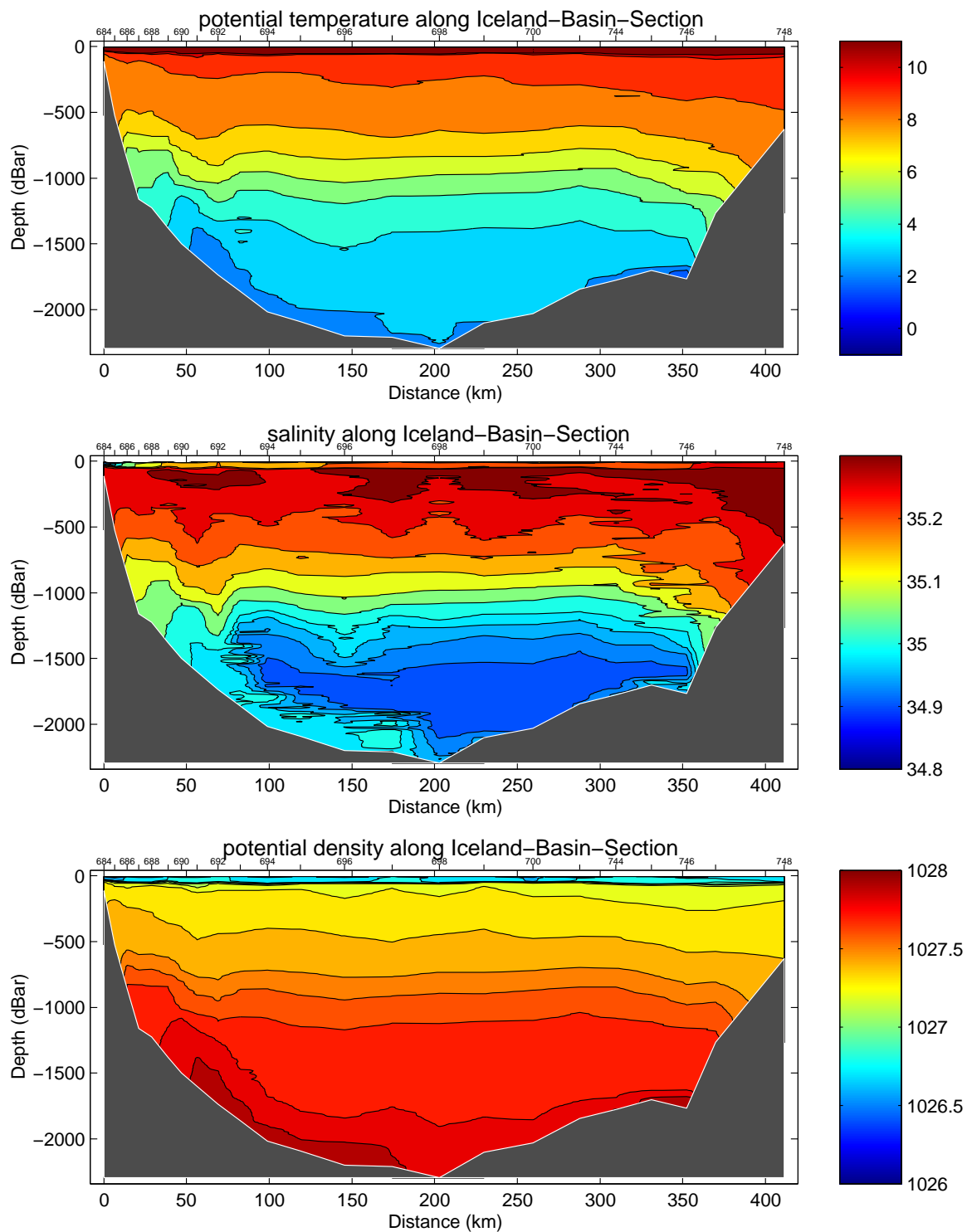


Figure 8: a) Potential temperature, b) salinity and c) potential density across the Iceland Basin section.

The distribution of temperature, salinity and density (fig.8) show that the upper 600 meters of the IB section consist of warm, saline, well mixed MNAW. On the eastern side the MNAW is dominant, indicated by the isolines in the upper layers sloping downwards. Only, a weak density gradient in the upper layers can be seen in the potential density profile indicating that the water is not very strongly stratified. This is due to wintertime

convection and strong winds which mix the upper layers and hereby create a homogeneous water column. A sharper gradient exists between the surface water and the underlying LBW. The LBW can be clearly identified in the salinity and temperature distribution in 1500 to 2000m where a low saline and higher temperature plume exists. From the potential temperature and the potential density distribution overflow water can be identified at the Icelandic continental slope in depths below approx. 1500 m. Surprisingly, some water with overflow characteristics is also located at the eastern slope of the section at a depth of approx. 1700 meters. This might be overflow water flowing through the gully at the exit of the FBC, according to the theory by Hansen and Oesterhus.

Conclusion:

The sloping isopycnals combined with the water mass distribution confirms the existence of a deep boundary overflow current running southward off the Icelandic coast and the northward flow of MNAW on the eastern part of the Iceland Basin section.

Water mass exchange across the Iceland Faroe Ridge

42 stations with a distance in between of about 3-5 sm were taken between Faroe and Iceland on top of the ridge. There are five trenches from which the deepest one is approximately 500 m. It is known that there is an inflow in the upper layer of warm and saline North Atlantic Water heading north into the Nordic Seas and an outflow of cold, relatively fresh overflow water going southwards. Especially, in the eastern part of the Iceland Faroe Ridge section the interface between these two water masses is sloping down towards the east, which indicates a northward geostrophic transport of North Atlantic Water and a southward transport of the overflow water.

The water masses (fig. 9) of the upper layers (MNAW) are characterised by temperatures higher than 7° C and salinities from 35.18-35.35 reaching down to 200m. On the eastern part of the ridge the upper layer mass is fairly homogeneous in temperature and salinity. Water masses of the lower layer, deeper than 300 m (overflow water) are colder and less saline and flow southwards. The interface between the two main masses is sloping down towards the Faroe Islands, which indicates a northward geostrophic transport of the upper layers and a southward flow of the lower layers. The overflow water is mainly concentrated on the western side of the deeper trenches. At the western part of the ridge close to the Icelandic coast, it exists a third water mass coming from the north of Iceland, the East Iceland Water. This water originates from the low salinity polar water, carried in the East Greenland Current. The EIW re-circulates into the Nordic Seas due to a pressure gradient towards the north. On the Faroe shelf the water is well mixed and homogeneous in temperature, salinity and density. This is caused by wind at the surface, strong tidal currents and the resulting bottom friction. Generally, salinity is low in the lower and upper layers. (The first 20m of salinity data was cut off due to inaccuracies.) In the middle there is a layer of high salinity with patches of even higher values.

The overflow water across the Iceland- Faroe-Ridge behaves mainly as expected from the influence of the geostrophic balance, with hugging the western side of the trenches, except of one case where it is leaning towards the eastern side of the trench (stations 718-723). The isolines in this area are doming. This strongly indicates the existence of an anticyclonic eddy. The radius of the eddy is about 50 km, which matches the calculated Rossby radius of approximately 37 km in this area.

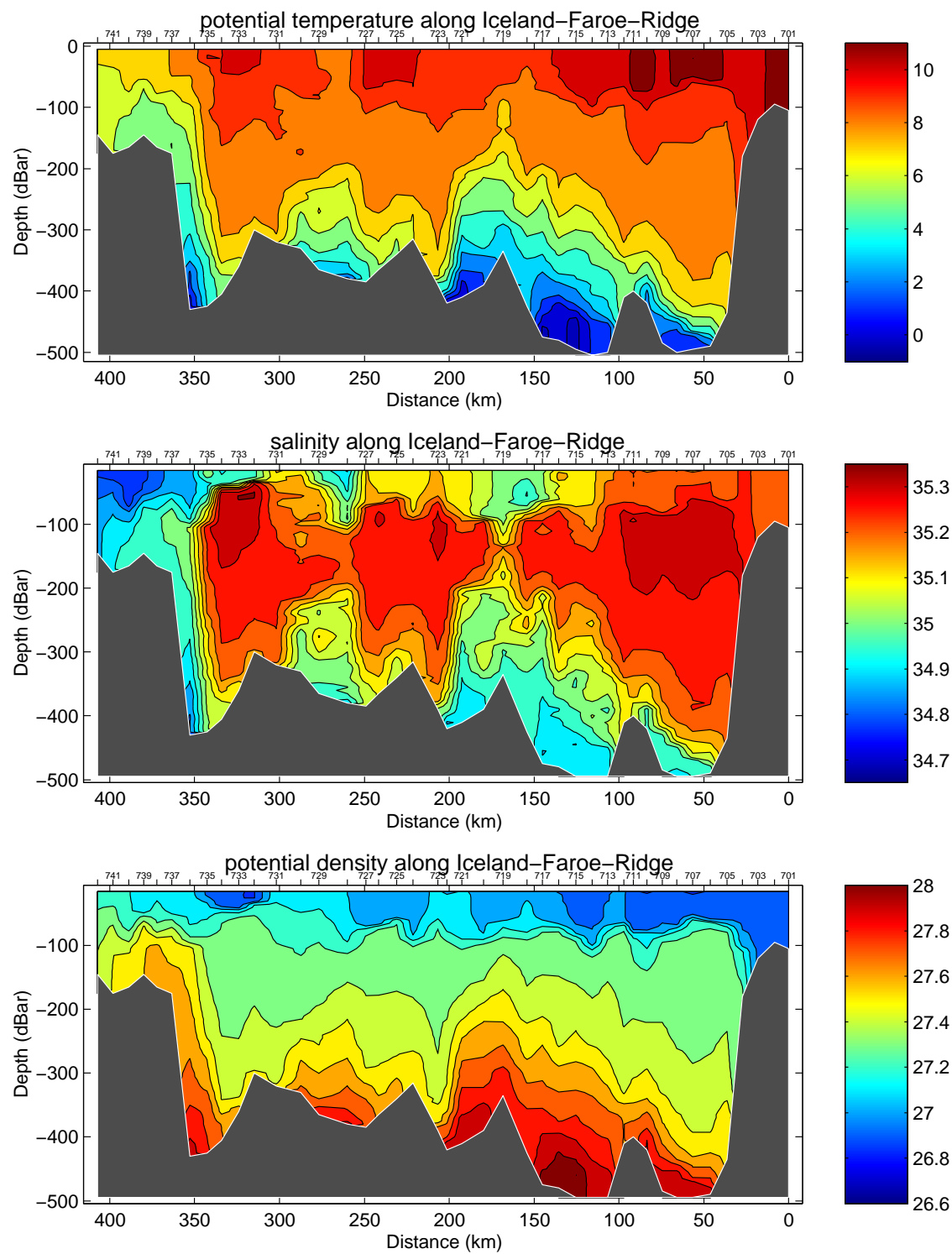


Figure 9: a) Potential temperature, b) salinity and c) potential density of the Iceland Faroe Ridge section

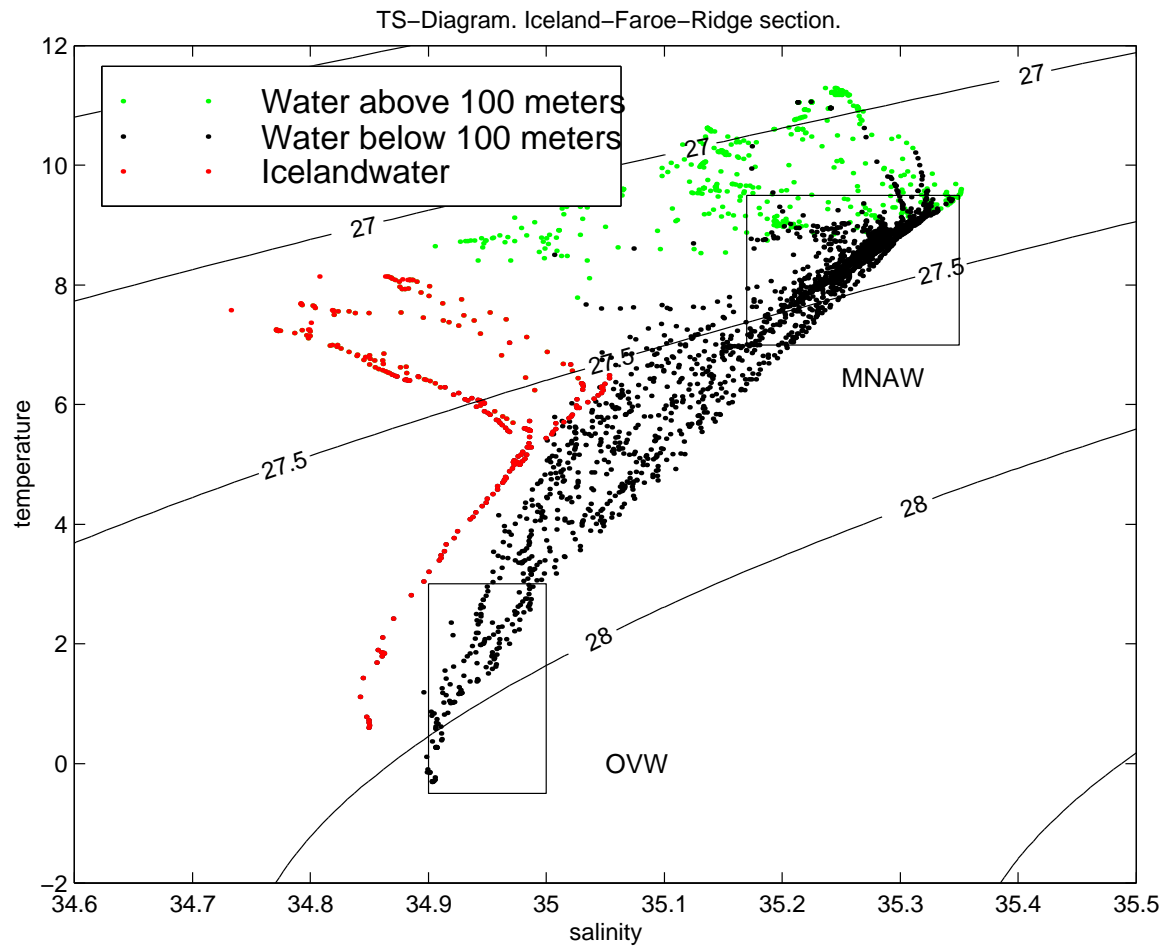


Figure 10: TS-diagram of the Iceland Faroe Ridge Section. The box in the upper right corner indicates the MNAW (Modified North Atlantic Water) with a temperature of 7-8.5 degrees and a salinity of 35.15-35.35. The lower box indicates the deep OW (Overflow Water) with a temperature of -0.5 – 3° C and a salinity of 34.9 – 35. The stations 736- 742 are plotted in red and indicate East Icelandic Water (EIW), which is defined by lower salinity. The green dots represent the upper hundred meters .

MNAW is the main water mass in the upper layer flowing northwards. OW is the main water mass in the lower layer flowing south. The low salinity water (EIW) was mainly located close to the Icelandic coast (fig. 9). The water in the upper hundred meters is modified by interactions with the atmosphere like rain, continental runoff and seasonal warming.

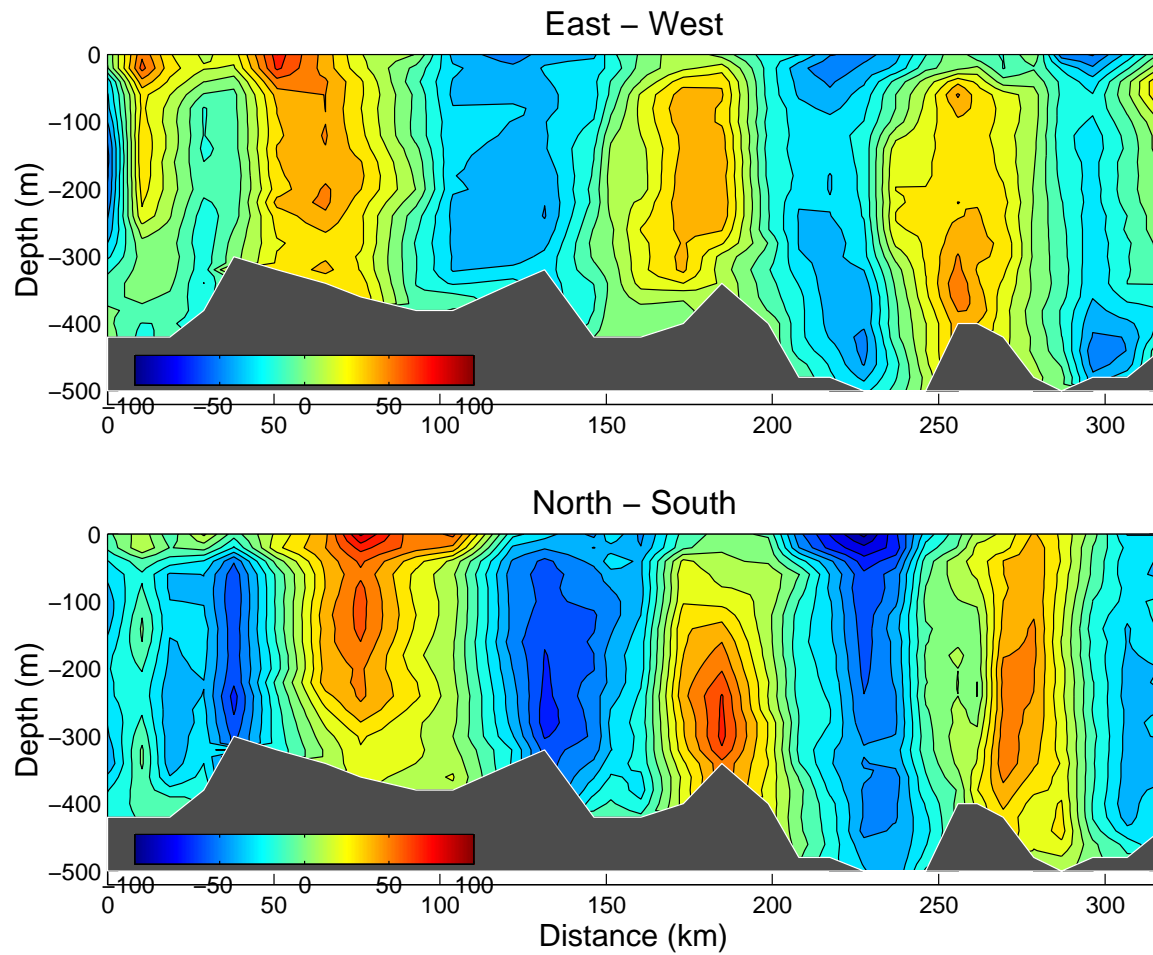


Figure 11: a) East-West component of the velocity distribution across the Iceland-Faroe-Ridge (cm/s) . Red indicates the eastward and blue the westward flow. b) North-South component of the velocity distribution across the Iceland-Faroe-Ridge (cm/s). Red indicates the northward and blue the southward flow.

The velocity distribution does not fit the expectations of a northward flow in the upper layer and a southward flow in the lower layer. Instead of a vertical structure, clear horizontal structures with very strong barotropic currents from the bottom to the top were found. The fact that these structures are so evenly distributed makes it unlikely that they are energetic eddies. It is more likely that the structures are caused by tides. Figure 12 shows the currents plotted versus time to detect possible periodic structures. The result looks very similar to a tidal vector profile. The structure repeats itself every six hours and the U and V components of the currents are in phase.

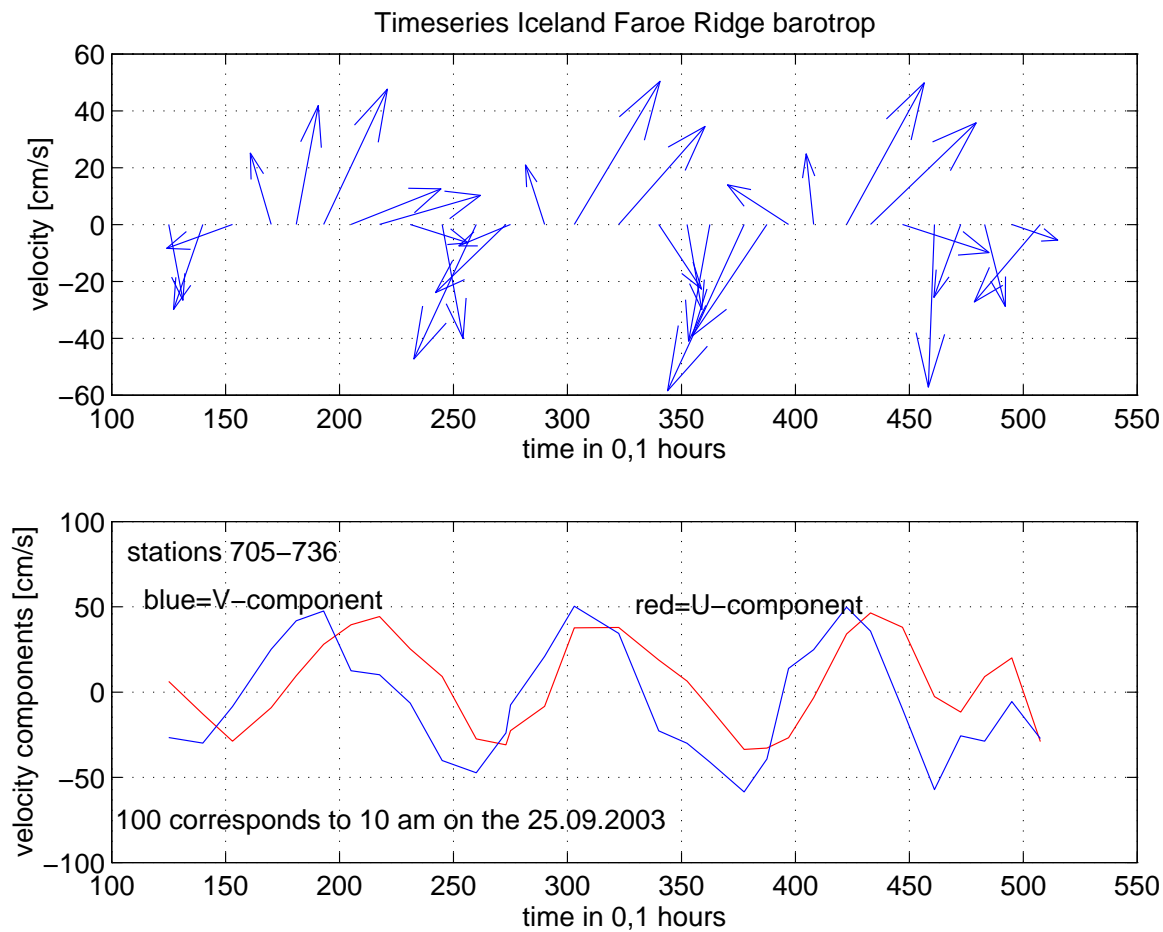


Figure 12: Velocity vectors plotted versus time. U is the East-West component (red) and V the North-South component (blue) of the currents.

Conclusions

- The water on the ridge consists of three basic water masses (MNAW, OW and EIW) and mixtures between them.
- As in other studies the sloping interface between the two main water masses (MNAW and OW) was also detected.
- There is evidence for eddy activity carrying overflow water across the ridge.
- East Iceland Water exist on the western side of the ridge.
- Strong tidal oscillations are overlaying the geostrophic transport.

Water mass exchange through the Faroe Bank Channel

CTD/IADCP measurements were made along three sections in the Faroe Bank Channel: the entrance section in the south-east of the channel, the central section over the sill and the exit section in the north-west. Fig. 13 – 16 show the temperature and salinity distribution of the entrance and exit sections. Generally, a two layer system in temperature and salinity can be identified in the Faroe Bank Channel consisting of a layer

of cold and fresh water (Overflow Water from the north) in the deep and a layer of warm and saline water (North Atlantic Water from the south) above. In between the two layers mixing takes place and the upper layer can also be modified by freshwater at the surface.

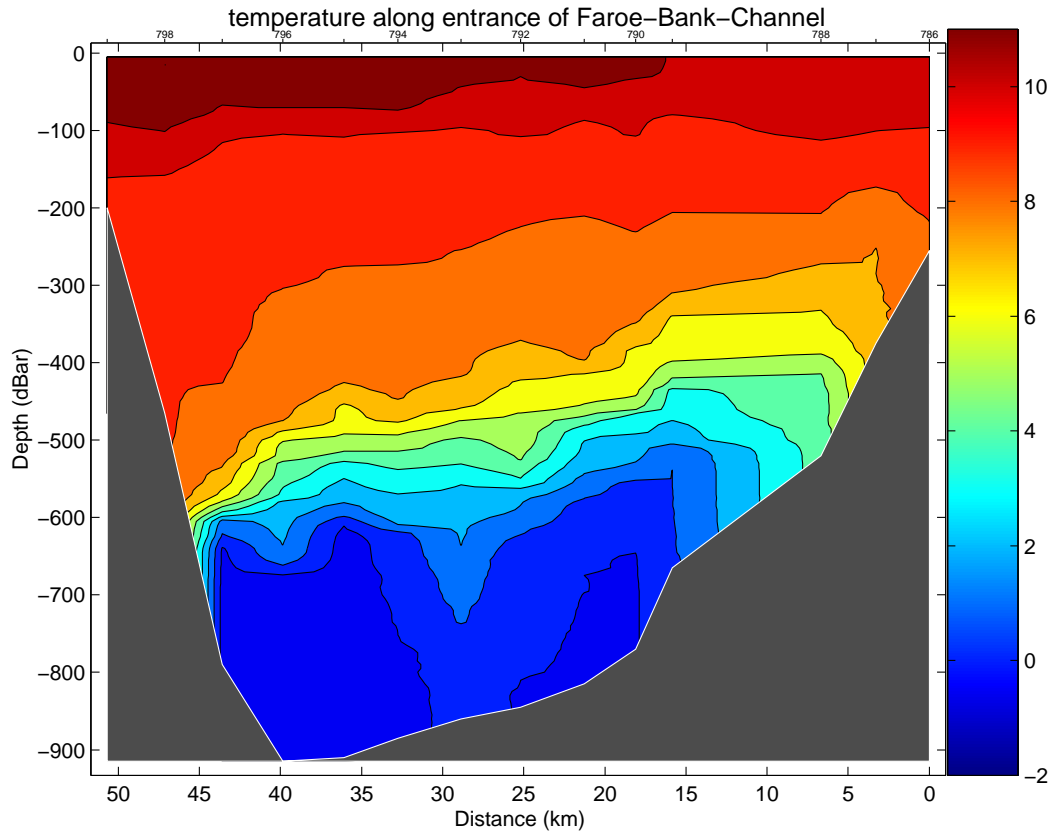


Figure 13: Potential temperature ($^{\circ}\text{C}$) distribution of the Faroe Bank Channel entry section (FB_en)

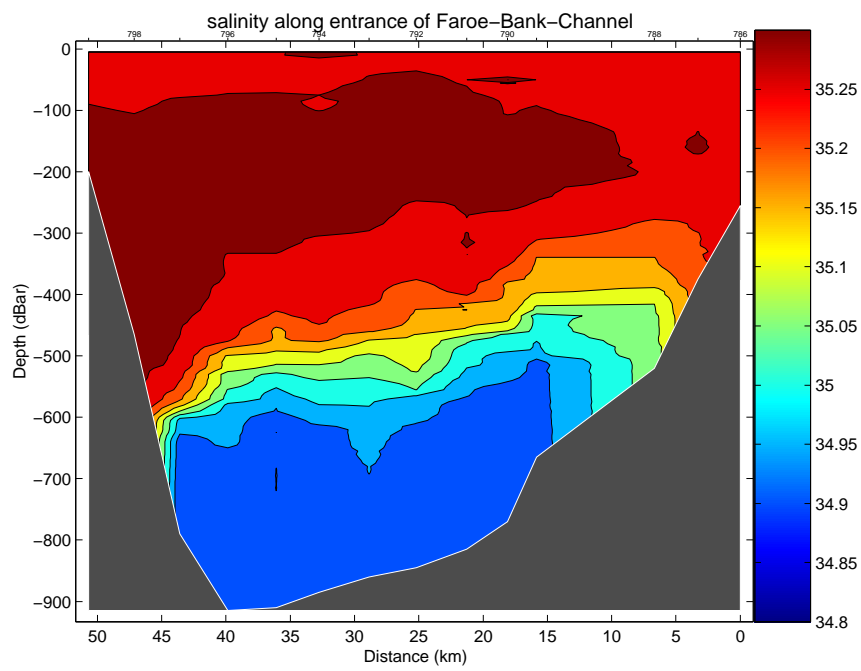


Figure 14: Salinity distribution of the Faroe Bank Channel entry section (FB_en)

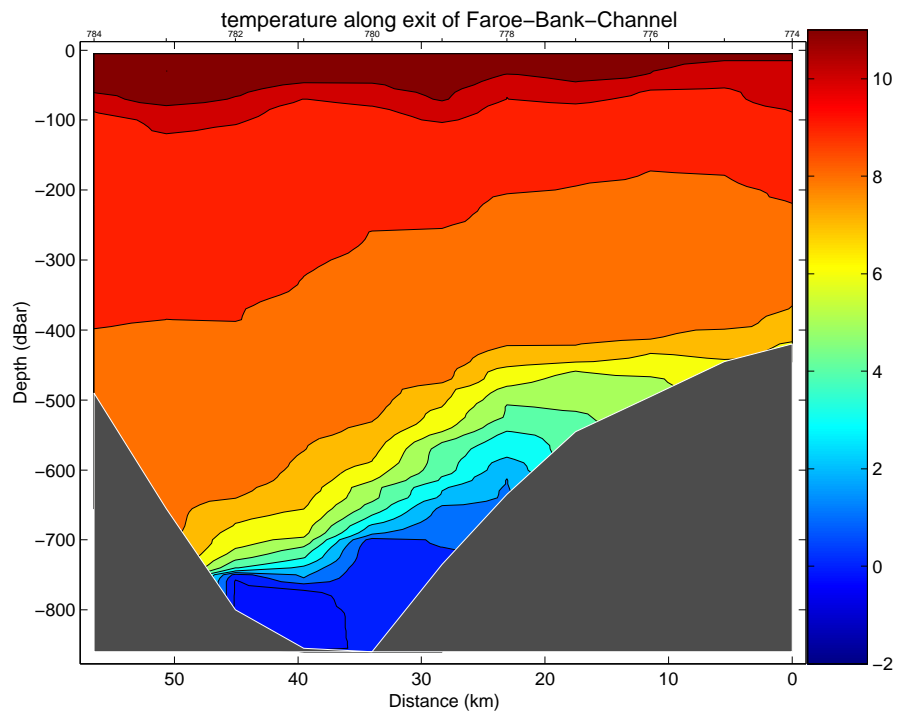


Figure 15: Potential temperature ($^{\circ}\text{C}$) distribution of the Faroe Bank Channel exit section (FB_ex)

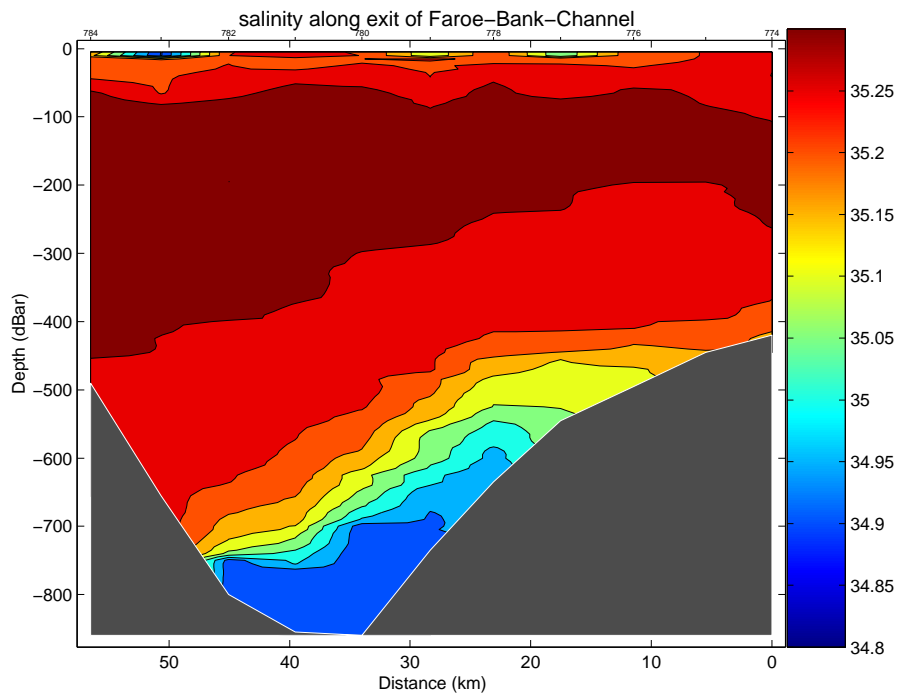


Figure 16: Salinity distribution of the Faroe Bank Channel exit section (FB_ex)

Water mass exchange across the Wyville Thomson Ridge

The Wyville Thomson Ridge is the boundary between the Faroe Shetland Channel in the north and the Rockall Channel in the south and has a sill depth between 450 and 600m. Fig. 17 shows the temperature, salinity and density distribution of the WTR section. The surface layers are dominated by the Continental Slope Current which transports warm and saline Atlantic water to the north. The maximum temperature of the water mass can be found in the eastern corner of the section. A small portion of overflow water coming from the north spills over the ridge on the western, deeper side of the section. But the major part of the overflow water is blocked by the ridge and has to flow through the deeper Faroe Bank Channel.

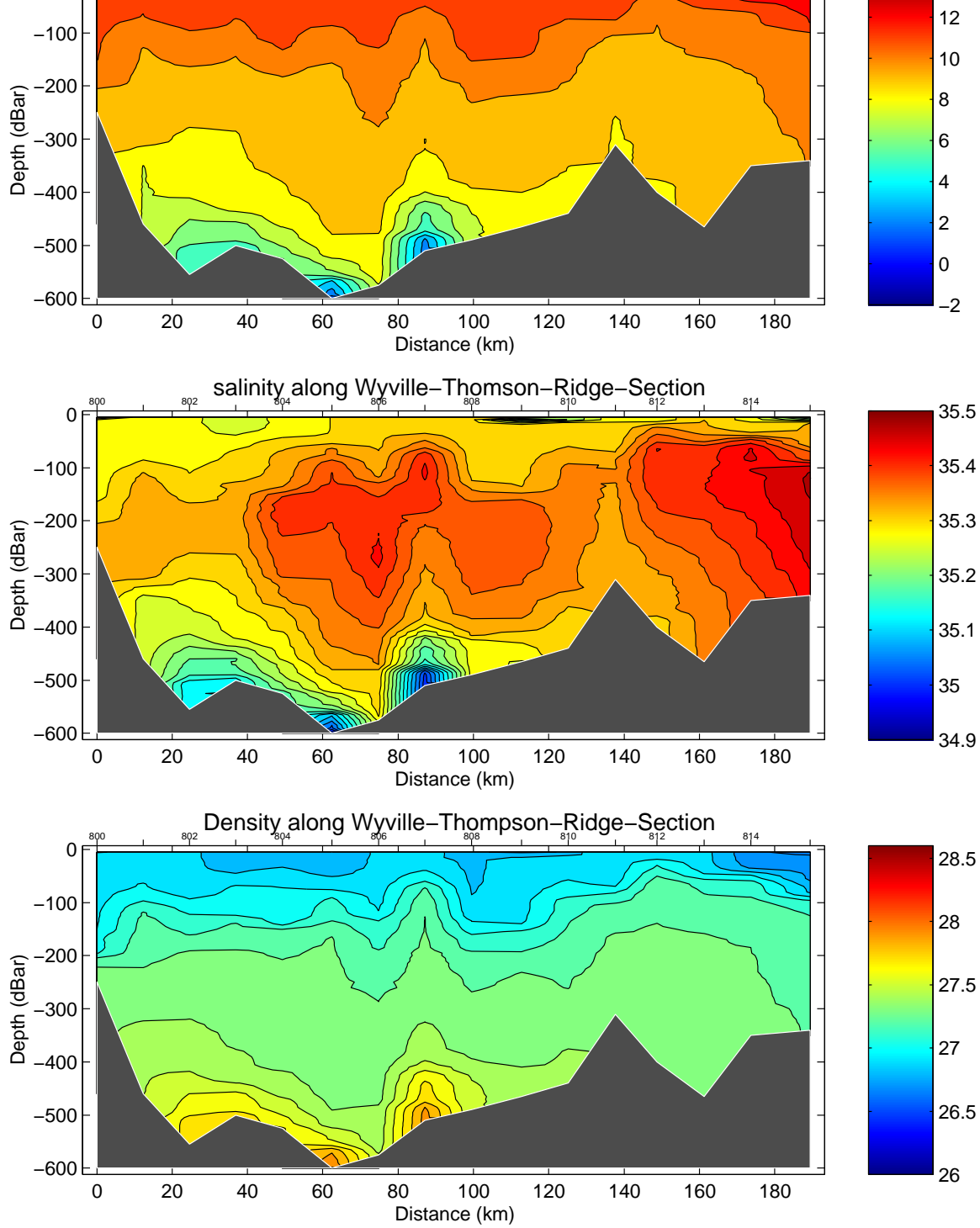


Figure 17: a) Potential temperature), b) salinity and c) density distribution of the Wyville Thomson Ridge section.

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